CLAIMS

1. A method of decomposition of waveforms in a cardiac signal using wavelet transform analysis.

2. A method as claimed in Claim 1 comprising the step of employing discretized wavelet transform analysis to process the said waveform.

3. A method as claimed in Claim 1 comprising the step of employing discretized continuous wavelet transform analysis to process the cardiac waveform.

4. A method as claimed in any preceding claim comprising the steps of deriving the wavelet energy surfaces of an electrocardiogram (EKG) signal; and plotting said wavelet energy surfaces against a location parameter *b*, and a scale parameter.

5. A method as claimed in Claim 4 wherein said scale parameter is dilation *a*.

6. A method as claimed in Claim 4 wherein said scale parameter is band pass frequency f_{bpc}.

7. A method as claimed in any preceding claim comprising the initial steps of connecting electrodes to a presenting patient; and sampling the analogue input signals recorded to derive the cardiac signal.

8. A method as claimed in any preceding claim including visually displaying the cardiac signal.

9. A method as claimed in any preceding claim including visually displaying the distribution of energies within the cardiac signal.

10. A method as claimed in any preceding claim including visually displaying coherent structures within the cardiac signal.

11. A method as claimed in any preceding claim including visually displaying the signal in real-time for clinical use.

12. A method as claimed in any preceding claim comprising the step of constructing a contour plot to display the decomposed waveform obtained.

13. A method as claimed in any preceding claim comprising the step of constructing a surface plot to display the decomposed waveform obtained.

14. A method as claimed in any preceding claim comprising the step of constructing a 2D or a 3D energy scalogram to display the decomposed waveform obtained.

15. A method as claimed in any preceding claim including the step of disassociating the component features of the temporal trace of a recorded EKG.

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16. A method for the analysis of an EKG of a heart in ventricular fibrillation including the method as claimed in any preceding claim.

17. A method for the analysis of an EKG of a heart in ventricular fibrillation after the commencement of cardio-pulmonary resuscitation (CPR) including the method as claimed in any of Claims 1 to 15.

18. A method as claimed in Claim 17 including the step of temporal filtering of the EKG signal of a heart that is subject to CPR to disassociate the CPR signal from the heart signal.

19. A method as claimed in Claim 17 or Claim 18 using wavelet *energy scalograms*.

20. A method as claimed in Claim 17 or Claim 18 using ridge following techniques

21. A method as claimed in Claim 20 wherein said ridge following techniques are modulus maxima techniques.

22. A method for the estimation of the health of a heart in VF including the method of any of Claims 1 to 15 to provide measurable characteristics.

23. A method as claimed in Claim 22 wherein said measurable characteristics are used to provide an estimate of the time elapsed since the onset of a cardiac incident.

24. A method as claimed in Claim 22 wherein said measurable characteristics are used to provide an estimate of the health of a heart after commencement of CPR.

25. A method as claimed in any of Claims 22 to 24 wherein said measurable characteristics are used to predict the outcome of a given therapeutic intervention.

26. A method as claimed in any of Claims 22 to 25 wherein said measurable characteristics are used to provide a guide for the optimal timing of defibrillation of a heart in VF.

27. A method for the analysis of an EKG of a heart in atrial fibrillation including the method as claimed in any of Claims 1 to 14.

28. A method as claimed in Claim 27 including the step of partitioning the signal to provide separate traces of QRS and T waves, and/or atrial activity and/or background noise.

29. A method as claimed in any preceding claim including the step of constructing a damage index for reference purposes.

30. A method as claimed in Claim 29 wherein construction of said index includes the step of developing network classifier from a library of recorded data.

31. A method as claimed in Claim 30 wherein said network classifier developed is a neural network.

32. A method as claimed in any of Claims 29 to 31 wherein said network classifier developed is a wavelet network classifier.

33. A method of decomposition of cardiac waveforms using matching pursuit algorithms.

34. Apparatus for decomposition of waveforms in a cardiac signal, said apparatus comprising wavelet transform analysis means.

35. Apparatus as claimed in Claim 34 including means to display the distribution of energies within a waveform.

36. Apparatus as claimed in Claim 34 or Claim 35 including a monitor adapted to display decomposed waveforms.

37. Apparatus as claimed any of Claims 34 to 36 adapted for inclusion in an EKG apparatus.

38. Defibrillation means adapted to operate in response to a signal generated by comparison of an EKG trace with decomposed waveform obtained by the method of any of Claims 1 to 33.

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39. A method as described in any of Claims 1 to 33 with reference to or as shown in the accompanying drawings.

40. Apparatus as described in any of Claims 34 to 38 with reference to or as shown in the accompanying drawings.

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